THE CLAIMS

What is claimed is:

1. A method of programmed displacement for prolong usage of an optical element under the irradiation of an intensive laser beam, comprising the steps of:
   directing said intensive laser beam in a predetermined direction toward and passing through said optical element;
   providing a driving mechanism to displace said optical element with respect to said intensive laser beam;
   providing a microprocessor control unit to control said driving mechanism to move in a step by step fashion;
   providing a monitoring means to monitor the intensity of an output beam from said optical element;
   scanning said optical element to determine initial defect locations of said optical element;
   storing initial defect locations in said microprocessor control unit;
   displacing said optical element step by step over the non-defect area of said optical element with a predetermined short interval between steps; and
   repeating said step of displacing said optical element again and again over said non-defect area of said optical element.

2. A method as in claim 1 wherein said optical element is a nonlinear optical crystal selected from BBO, LBO, CLBO, KTP, KD*P, and KDP crystals.

3. A method as in claim 1 wherein said optical element is an UV optics.

4. A method as in claim 1 wherein said optical element is a laser crystal selected from Nd:YLF, Cr:LiSAF, Cr:YAG, and Ho:YAG.

5. A method as in claim 1 wherein said intensive laser beam is delivered from a CW laser.

6. A method as in claim 1 wherein said intensive laser beam is delivered from a pulsed laser.

7. A method as in claim 1 wherein said intensive laser beam has a pulse duration in the range of 1 fs to 10 ms.

8. A method as in claim 1 wherein said intensive laser beam has a wavelength ranging from 100 nm to 1 micron.

9. A method as in claim 1 wherein said intensive laser beam has a wavelength around 420 nm and said output beam has a wavelength around 210 nm.

10. A method as in claim 1 wherein said intensive laser beam has a pulse duration ranging from 0.1 ns to 100 ns.

11. A method as in claim 1 wherein said intensive laser beam has a pulse repetition rate ranging from 0.1 kHz to 100 kHz.

12. A method as in claim 1 wherein said intensive laser beam has a pulse energy ranging from 0.1 mJ to 20 mJ.

13. A method as in claim 1 wherein said driving mechanism consists of two step-motors.

14. A method as in claim 1 wherein said monitoring means is an UV photo detector.

15. A method as in claim 1 wherein said step of displacing said optical element includes displacing said optical element in a serial of linear paths.

16. A method as in claim 1 wherein said step of displacing said optical element includes displacing said optical element in a serial of irregular loops.

17. A method as in claim 1 wherein said predetermined short interval is in the range of 1 ms to 1 minute.

18. A method as in claim 1 wherein said predetermined short interval is correlated with the scan time needed for one layer of UV ablation in a refractive surgery.

19. A method as in claim 1, further comprising the steps of:

monitoring said intensity of said output beam from said optical element to determine newly developed defects of said optical element;

adding locations of said newly developed defects to said microprocessor control unit;

20. An apparatus of programmed displacement for prolong usage of an optical element under the irradiation of an intensive laser beam, comprising:

said intensive laser beam directed in a predetermined direction toward and passing through said optical element;

a driving mechanism to displace said optical element with respect to said intensive laser beam;

a microprocessor control unit to control said driving mechanism to move in a step by step fashion;

monitoring means to monitor the intensity of an output beam from said optical element;

wherein said optical element is first scanned to determine initial defect locations of said optical element, said microprocessor control unit then stores said initial defect locations and displaces said optical element step by step over the non-defect area of said optical element with a predetermined short interval between steps, and said microprocessor control unit further repeats said displacement of said optical element again and again over said non-defect area of said optical element.